

apparatus. Their school microscope, with objective eyepiece, rack focussing stand with firm foot, is priced at 35s. We welcomed old and tried friends in the Becker's Sons' balances, and a new one in the Dobbs's dynamometer, which appeared among Messrs. Townson and Mercer's display. Mr. Thomas Wyatt exhibited the appropriately named Massey series of apparatus for practical mechanics, and some Haldane Gee instruments of better construction than those on the market in former days. The stills and ovens of Messrs. Brown and Son are well known to chemists; they should be well known to science masters.

We have not space to describe the extensive exhibit of books by Messrs. Arnold, G. Bell, Clive, Macmillan, Methuen, and the Cambridge and Oxford University Press.

Some of the amateur exhibitors were at too little pains to show their work effectively, and we would remind them of the necessity of making clear at once, by diagram or otherwise, the main point of their exhibits. If a plan of the exhibits could be added to the catalogue it would be helpful. The trade exhibits are of undoubted utility, especially to country workers, but it is to be hoped that the invaluable display of resourcefulness and ingenuity springing from our school laboratories will not be relegated to a subordinate position. The thanks of all who had the good fortune to see this successful exhibition are due to the hon. secretaries, Mr. D. J. P. Berridge and Mr. G. H. Martin, for their skilled cataloguing and organisation.

The president of the association next year will be Prof. H. E. Armstrong, F.R.S., who has given the society much help since its foundation. G. F. DANIELL.

VARIOUS INVERTEBRATES.

THE fourth volume of zoological reports on the *Discovery* collections is full of interest and fine workmanship. It well deserves its beautiful "get-up." Dr. H. F. Nierstrasz describes the single Solenogaster in the collection—naming it rather awkwardly *Proneomenia discoveryi*, sp. n., and takes a survey of the family Proneomeniidae. Prof. G. H. Carpenter gives an account of a remarkable collembolon—*Gomphiocephalus hodgsoni*, g. et sp. n.—apparently an ancient connecting link between Poduridae and Entomobryidae. In contrast to these two cases of sparse material, we find Mr. W. M. Tattersall reporting on more than ten thousand schizopods, mostly referable, however, to one species. He and Mr. Holt have been able to add ten to the previous list of seven South Polar schizopods, and the present memoir as some interesting results as regards life-history and distribution. The collection includes no species of schizopod common to both polar regions, but all the genera save one, *Antarctomyxis*, are represented in northern waters. The northern species are quite distinct from their southern allies.

Similarly Dr. R. N. Wolfenden notes that the Antarctic copepod fauna is distinct from that of Arctic seas, and that the species which are typical of the Antarctic and most numerous do not extend far into the southern Atlantic at least. The *Discovery*, like the *Gauss*, was fortunate in finding the interesting crinoid *Promachocrinus*, which was one of the prizes of the voyage of the *Challenger*. Prof. F. Jeffrey Bell deals with this re-discovered treasure, and with a number of interesting new forms; he also directs attention to the "bewildering" variability of several species, e.g. *Cycethra verrucosa*. His memoir has numerous illustrations of a certain dry humour, as when he notes that "even the most recent writers on echinoderms have not yet promulgated the doctrine that difference in size is a specific character, though I am not quite sure that in practice they do not sometimes act as though they had." It has been supposed that none of the Antarctic echinoderms has free-swimming larvæ, but Prof. E. W. MacBride and Mr. J. C. Simpson describe the plutei of a sea-urchin and an ophiuroid. They also found an unsuspected brood-pouch in *Cucumaria crocea*, a well-known holothurian.

Bell's *Antedon adriani* yielded two species of Myzostomum, which Dr. Rudolf Ritter von Stummer-Traunfels deals with.

¹ National Antarctic Expedition, 1901-4. Natural History. Vol. iv., Zoology. Pp. 280; 59 plates. (Printed by Order of the Trustees of the British Museum, 1908.)

One is new, *M. antarcticum*, illustrating the common experience that every new species means another new species—of parasite; the other, *M. cysticum*, has been previously recorded from Ross's Sea in the Antarctic, from off the east coast of Japan, and from the tropical West Atlantic—a remarkable distribution which finds its explanation in the antiquity of the myzostomid group and in the uniformity of deep-water conditions. The sipunculids are represented by some thirty specimens. These Mr. W. F. Lanchester describes under the title *Phascolosoma socius*, n. sp., and in so doing makes some interesting critical remarks on the relative value of the systematic specific characters in this group. Two new sea-anemones are described by Mr. J. A. Clubb, but the most interesting part of his report is the description of the sixteen "brood-pouches" of *Cribrina octoradiata* (Carlgren) from the Falkland Islands. Each pouch arises as an invagination of the three layers of the body-wall, retains its external pore, and usually contains two embryos. In reporting on the tetractinellid and monaxonellid sponges, Mr. R. Kirkpatrick describes twenty-two new species of the latter, and establishes four genera. Some of the records of Antarctic distribution are striking, e.g. that of *Esperiopsis villosa*, Carter, a form frequently recorded from high northern latitudes, but only from one intermediate station, viz. in deep water off the Azores; or that of *Sphaerotylus capitatus* (Vosmaer), an Arctic form, not reported from any intermediate locality—as yet. There are no fewer than nineteen plates illustrating this memoir, and there are twelve illustrating Mr. T. F. Jenkin's admirable account of the Calcareia, which teems with novelties, two new families, six new genera, and new species galore. Altogether, it cannot be doubted that the *Discovery* was true to her name.

THE DANISH NORTH-EAST GREENLAND EXPEDITION.

THE account of the Danish North-east Greenland Expedition, given by Lieut. A. Trolle before the Royal Geographical Society on December 7, 1908, is printed in the January number of the society's journal, with several instructive illustrations and a map. During this expedition, which lasted two years, the little-known fjords and coast of north-east Greenland were explored, and much other valuable scientific work was accomplished, though the tragic death of the leader, Mylius Erichsen, and his two companions, Hagen and Brönlund, while on a sledge expedition, gives melancholy interest to it. In his lecture Lieut. Trolle only referred in general terms to the results of the scientific work carried on by the various observers during the expedition, as these will be published later, but the subjoined extracts from the paper, and the two illustrations here reproduced by permission of the Royal Geographical Society, will show that the expedition was marked by notable achievements.

The object of the expedition was to explore the last of the hitherto unexplored parts of Greenland. The whole of the west coast from 78° N. lat. to Cape Farewell is, as is well known, under the administration of Denmark. On the east coast there is a Danish colony at Angmasalik, while great parts of the coast had been mapped by Captains Holm, Garde, Ryder, and Amdrup. The stretch from 72° to 77° N. lat. had been explored, chiefly by Clavering and Sabine, by the *Germania* Expedition, by the English whaler Scoresby, and the Swedish explorer Nathorst. From 77° N. lat. and farther north the country, however, was practically unexplored, though the Duke of Orleans, on the *Belgica*, in 1903, had gone as far as 78½° N. lat., and from his ship had seen part of the outer islands.

The north-west had chiefly been explored by British and American expeditions, and the chief merit of the *Danmark* Expedition is that it has now supplemented what was still wanting in a knowledge of the outlines of Greenland by exploring the whole of the north-east coast.

The expedition consisted of twenty-eight members, and a characteristic feature of its organisation was the unusually large scientific staff and proportionately small crew, in the proper sense of the word. Thus there were six

cartographers (under Captain Koch, R.D.I.), two meteorologists, two zoologists, one botanist, one geologist, one hydrographer, one ethnologist, one physician, and two painters, besides one ice-master, two mates (both of whom belonged to the cartographers' staff), two engineers, two

We anchored the *Danmark*, the bow pointing southward, and with hawsers from the stem to the shore. After that we built some houses ashore, in which the various branches of scientific research were to be carried on, and the latter commenced.



FIG. 1.—Typical Fjord in the interior of King Frederick VIII. Land, Lat. 77° N.

stokers, three Eskimo, and only three sailors. The scientific staff, however, had agreed to do the common ship's work besides their own special work, and, upon the whole, this arrangement worked rather satisfactorily.

The expedition left Copenhagen in June, 1906. On July 31 we saw our first ice, passing along the outer rim of some small hummocks, and on the next day we were at the border of the heavy pack-ice, as well as at the edge of the continental shelf. We knew this because our sounding-lead, which had just shown a depth of 1300 fathoms, now only showed 165. This seems to indicate that the chief branch of the south-going polar current runs across the shoals which are found everywhere outside the east coast of Greenland, but gradually lessens its strength over the deep sea.

We fought our way through the ice, one day, in spite of continuous efforts, only advancing a mile or two, the next day perhaps proceeding ten to fifteen miles. Twice we were surrounded by the ice for a period of thirty-six hours, and in the beginning it looked dangerous enough, but the conditions soon became better, and we got through.

On August 13—we had taken thirteen days for 140 miles—we reached land. At last we were sailing in the so-called shore-water, where the ice was very loose. We had reached as far north as we had ever dared to hope, but we tried to go still further in the shore-water. At Isle de France ($77\frac{1}{2}^{\circ}$ N. lat.) we were stopped by impenetrable pack-ice, and had to go back, after having landed Captain Koch and several other cartographers, together with some big caches of provisions, at the most northerly point of the continent. The harbour place which we chose was one we had previously found inside the outer range of ice, and thus protected against the heavy pressure of the pack.

The land of King Frederick VIII. is a beautiful mountainous country, in many places very much like Norway—the same picturesque valleys, the same deep fjords, with steep mountains, as high as 2000 feet on both sides, which have inspired our two painters, Fries and Berthelsen, numerous islets and rocks intersected with sounds. Everywhere there were traces of glaciers from the Ice period, but still earlier the country must have had a milder climate. The geologist, Jarner, found impressions of animals and plants from this period in the sandstone of the Malemuk Mountain, on Koldewey Island, and Hochstetter Foreland, and brought a fine collection home.

The country is not very wide. At 77° lat. the bottom of the interior fjords is reached about forty to sixty miles from the coast, and here generally a glacier is coming down from the inland ice. Farther north, at Jökel Bay, however, the inland ice goes directly into the sea, and the coast-line here consists of two ranges of islets. At the Malemuk Mountain there is some more free land, but it is narrower, and becomes lower and lower, until it finally disappears, and the inland ice again goes straight into the sea. Danmark

Fjord is a big, mountainous fjord, eighty miles deep. Peary Land is not covered with inland ice; its southern coast is very low, and in the interior there are mountains to a height of 2000 feet. All this coast-line up to Cape Bridgeman and most of the edge of the inland ice has been mapped by the cartographers' staff, under Captain Koch, by theodolite measurements in a very

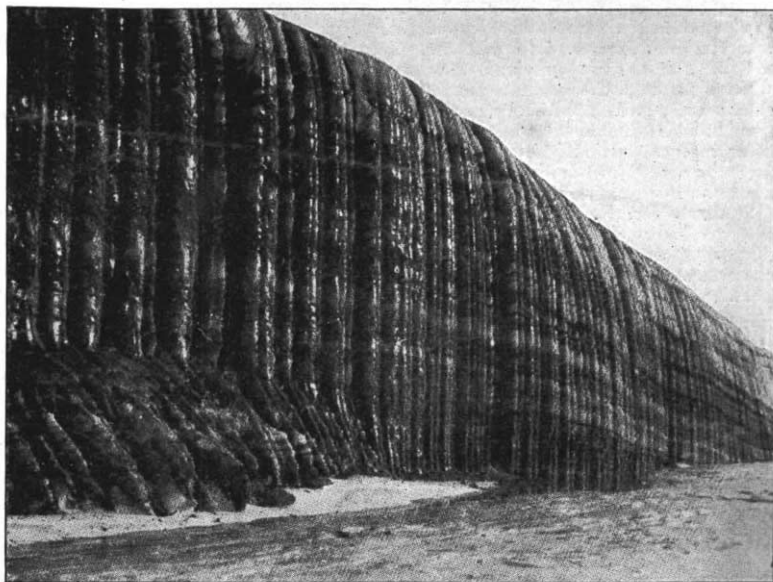


FIG. 2.—Edge of the inland ice, Lat. 77° N.

exact manner. The country in the neighbourhood of the harbour has been mapped topographically, and the triangulation there is brought in connection with the German triangulation in 1870.

The most interesting geographical feature is the big

peninsula going eastward to 12° W. long., so that the outlet between Greenland and Spitsbergen of the great Polar basin thus becomes rather narrow. In this connection I shall just mention that Dr. Nansen, on account of his hydrographical observations in the Polar sea, supposed the existence of a suboceanic ridge between Greenland and Spitsbergen, and as the coast of Greenland here is quite flat, the probability is that such a ridge really exists.

The frontier of the inland ice is in some places quite steep, in other places you might have mounted the inland ice without knowing it. The glaciers are few and not very productive; still, the fjords are sometimes quite filled up with icebergs stranded on barriers in the mouths of the fjords.

In the interior, about forty miles from the edge of the inland ice, we found and mapped out some islands, nunalands, quite surrounded by the inland ice. Strange though it may sound, we here saw flowers and tracks of foxes; also in some places coal. During the winter the land was covered with snow, with only here and there some bare wind-swept spots. In the spring this snow partly evaporated, even with a temperature of 20° F. Then the water began to melt in the ravines, and, running under the glaciers, it formed the most fantastic ice-grottoes, where the light was broken into all colours through the crystal-like icicles.

The change into summer was quite sudden. Gradually the temperature of the snow had risen to zero, and then in one day it all melted. The rivers were rushing along, flowers were budding forth, and in the air the butterflies were fluttering. It was a lovely time, bringing hard work for the botanist Lundager and the zoologists Manniche and Johansen. The birds came nearly all on the same day, most of them even at the same hour. One day we had only had the ordinary ptarmigan and the raven; the next we had the sanderling, the ring-plover, the goose, the eider duck, and many others. Young sanderlings, icelandic ring-plovers, and Sabine gulls were found by Mr. Manniche, our indefatigable ornithologist, and fine specimens were brought home.

Of larger animals we found bears, musk-oxen, and wolves; foxes on land, and walruses and seals at sea. Bears are rather plentiful; we shot ninety in all, but musk-oxen and wolves are scarce. The five wolves we got were, I believe, all that were there. They were very meagre, and looked as if they had had nothing to eat for a long time. The snow-hares, which we found in great numbers, were very tame in April and May, and we could then go quite close to them. In the sea, the lakes, and the rivers animal life was not abundant. Some polar cod and inferior animals were usually the results of our net-fishing. In one of the lakes, however, salmon were plentiful.

Especially in the autumn we had the most beautiful Fata Morgana, with castles and ships high up in the clear air, while also the outlines of the coast were quite changed. The explanation of this is the great difference in temperature between the air and that of the new ice, which has still the temperature of the water. Our meteorologist, Mr. Wegener, studied these phenomena with great skill, and, moreover, took magnetic and electrical observations.

In the beginning of November the sun left us for good, the red colours of the southern sky grew fainter and fainter, while from the north darkness spread all along the sky. The temperature went down; in February and March it was as low as -58° F., but at times it would again rise to 32° and even to 34° . Mr. Wegener sent up his kites and balloons throughout the whole winter, and the instruments often registered a much higher temperature in the upper strata of the air.

As a rule, the weather was calm and clear, but when the barometer sank the temperature rose, and the sky became overcast; we all sought shelter, for then we knew that a storm was coming, drifting the snow high above the masthead, and generally lasting for two or three days.

We spent two years in Greenland, and in these two years the weather was quite different. (The winter of 1906-7 was cold and calm, that of 1907-8 milder and more windy. The ice in the first winter grew 6 feet thick and broke up very late, in the second it was only 4 feet thick.) In the middle of February the sun came back, and May

and June were a period of fogs and faint sea breezes. Otherwise, the wind was constantly from the north-west, coming from the high pressure of air which is found over the inland ice.

We found no living Eskimo, but everywhere along the coast up to the Danmark Fjord we found their tent stones, their meat caches, and in some places even winter dwellings. From kayaks and umyaks they have hunted the same animals which we found there, and besides whales and reindeer, which we did not find. Our ethnologist, Thostrup, made a very interesting collection of their various tools, &c.

Outside the coast the pack-ice was moving southward with the polar current, and we have mapped out the border of this pack-ice, which showed that the current is everywhere following the line of the outer islands and rocks, while in the waters inside this line pack-ice is rarely found. It was rather an interesting fact that we found great lanes in the ice from 80° to 82° N. lat. At the Malemuk mountain we found open water every time, in April, June, and November, the cause of which may be the current. The water in the fjords was mixed polar and gulf water, the gulf water probably running in along the supposed Greenland-Spitsbergen ridge and going southward with the polar current.

By making holes in the ice investigations were carried on even at a temperature of -2° F. In a big fresh-water lake salt water was found, giving an odour of sulphide of hydrogen at the bottom. The lake must formerly have been a fjord, but the land rose so that the fjord became a lake. The geological conditions, as well as the fact that we found the carcass of a big whale at the border of this lake, seem to strengthen this theory. The tides were not very strong; the ordinary difference between high and low water was 5 feet.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The council of the Senate reports that it has had under consideration the position of the study of astrophysics in the University in connection with the offer of the Royal Society to give to the University the equipment of Sir William Huggins's observatory. It is of opinion that the time is opportune for giving further recognition in Cambridge to astrophysics. With the approval of the general board of studies, the council recommends to the Senate the establishment of a professorship of astrophysics, without stipend and limited to the tenure of office of the first professor.

Mr. H. O. Jones, of Clare College, has been approved as deputy for Sir James Dewar, the Jacksonian professor of experimental philosophy, during the Lent term of 1909.

An examination for minor scholarships in natural science and mathematics will be held in Downing College on Tuesday, March 2, and subsequent days. The examination in natural science will consist of paper work and practical work in (1) chemistry, (2) physics, (3) biology, (4) comparative anatomy, (5) botany. No candidate will be examined in more than three of the above subjects, and great weight will be given to proficiency in some one subject.

The qualifying examination for the mechanical sciences tripos is now held in June and at the end of November. The majority of the students take the examination in June, and experience has shown that the November examination is not much used. It is proposed to substitute for this latter an examination in November at which the best students—those who desire to take the tripos in two years—may pass the examination immediately on coming into residence.

MR. W. MORGAN has been appointed professor of motor-car engineering at the Merchant Venturers' Technical College, Bristol.

It is announced in *Science* that Mr. G. M. Laughlin, of Pittsburg, has bequeathed 20,000*l.* to Washington and Jefferson College.